In the Claims

Please rewrite the indicated claims to read as follows:

1. (Twice amended) Method for operating a multi-phase process that is chemical, physical, or both, in a vessel containing at least two different phases selected from the group consisting of a liquid phase, a gas phase and a solid phase, inside which vessel a fluid is distributed through a hierarchical network of channels comprising parent and child generations of channel formations, wherein substantially each channel in a parent generation is divided into N channels of a child generation, wherein each channel of said child generation may in turn be a parent for channels in a successive child generation, which network terminates in channel exits, such that said fluid is discharged from the channel exits substantially uniformly throughout the vessel volume.

4. (Twice amended) Method for operating a process that is chemical, physical, or both, in a vessel containing at least two different phases selected from the group consisting of a liquid phase, a gas phase and a solid phase, throughout which vessel a fluid is distributed through a hierarchical network of channels comprising parent and child generations of channel formations, wherein substantially each channel in a parent generation is divided into N channels of the child generation, wherein each channel of said child generation may in turn be a parent for channels in a successive child generation, which network terminates in channel exits, such that said fluid is discharged from the channel exits substantially uniformly throughout the vessel volume, wherein said network is a self-affine network of channels, wherein each of the channels in the parent generation has a diameter d_j and a length l_j, and each of the channels in the child generation has a diameter d_{j+1} and a length l_{j+1}, wherein at least one of the ratios d_j/d_{j+1} and l_j/l_{j+1} is substantially

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constant for channels of successive generations running in parallel direction, wherein the ratio of lengths of channels in successive generations of said network is related to N by the formula, $N = (l_j/l_{j+1})^D$, wherein D is between 2 and 3.

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6. (Twice amended) Method for scaling up a multi-phase process that is chemical, physical, or both, and that is carried out in a vessel containing at least two different phases selected from the group consisting of a liquid phase, a gas phase and a solid phase,, comprising the steps of:

building a small scale vessel;

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distributing a fluid through a hierarchical network of channels comprising parent and child generations of channel formations, wherein substantially each channel in a parent generation is divided into about N channels of the child generation, wherein each of the channels in the parent generation has a diameter d_j and a length l_j and each of the channels in a child generation has a diameter d_{j+1} and a length l_{j+1}, which network terminates in channel exits, such that said fluid is discharged from the channel exits substantially uniformly throughout the vessel volume;

determining optimal geometry and optimal values for the parameters, N, Δ and D, wherein the diameters or the lengths of channels in successive generations of said network, or both, are related to N by at least one of the following relationships: $N = (d_j/d_{j+1})^{\Delta}$ and $N = (l_j/l_{j+1})^D$, wherein Δ and D each represents an integer or a real positive number; and

subsequently building a large scale vessel having substantially the same geometry and parameters as the small scale vessel, and having a larger number of generations than the small scale vessel.

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